

**SPIDER FAUNA OF RADHANAGARI WILDLIFE SANC-
TUARY, CHANDOLI NATIONAL PARK
AND
KOYNA WILDLIFE SANCTUARY**

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ABSTRACT

Diversity of spiders from Radhanagari Wildlife Sanctuary, Chandoli National Park and Koyna Wildlife Sanctuary in Western Ghats is studied for the first time. A total of 247 species belonging to 119 genera and 28 families are recorded from the study area during 2010-2012 with a dominance of Araneid, Salticid and Lycosid spiders.

Key words: Spider diversity, Western Ghats

INTRODUCTION

Spiders comprise one of the largest (5-6th) orders of animals. The spider fauna of India has never been studied in its entirety despite of contributions by many arachnologists since Stoliczka (1869). The pioneering contribution on the taxonomy of Indian spiders is that of European arachnologist Stoliczka (1869). Review of available literature reveals that the earliest contribution by Blackwall (1867); Karsch (1873); Simon (1887); Thorell (1895) and Pocock (1900) were the pioneer workers of Indian spiders. They described many species from India. Tikader (1980, 1982), Tikader, and Malhotra (1980a,b) described spiders from India. Tikader (1980) compiled a book on Thomisid spiders of India, comprising two subfamilies, 25 genera and 115 species. Of these, 23 species were new to science. Descriptions, illustrations and distributions of all species were given. Keys to the subfamilies, genera, and species were provided. Tikader and Biswas (1981) studied 15 families, 47 genera and 99 species from Calcutta and surrounding areas with illustrations and descriptions. Pocock (1900) and Tikader (1980, 1987) made major contributions to the Indian Arachnology, have high lightened spider studies to the notice of other researcher. Pocock (1900) described 112 species of spiders from India. His book provided the first list of spiders, along with enumeration and new descriptions in British India based on spider specimens at the British Museum, London. Tikader (1987) also published the first comprehensive list of Indian spiders, which included 1067 species belonging to 249 genera in 43 families. From the last three decades, contribution of Gajbe (1995-2003) to the field of spiders is noteworthy. He described 147 new spider species from different habitats of India. He published 69 papers on Araneid, Gnaphosid, Lycosid, Thomisid and Oxyopid spiders and also State Fauna series (2007, 2008a, 2009).

The updated spider checklist given by Keswani *et al.* (2012) of SGB Amravati University Arachnology laboratory shows 1686 species from 438 genera and 60

families. Among the sixty families, 5 families represented more than 100 species and they are: Salticidae (73 genera and 207 species), Thomisidae (40 genera and 176 species), Araneidae (28 genera and 163 species), Gnaphosidae (30 genera and 146 species) and Lycosidae (19 genera and 133 species). According to world spider catalogue there are Spiders of protected areas in India, are studied by Gajbe (1995a) in Indravati Tiger Reserve and recorded 13 species. Rane and Singh (1977) recorded five species and Gajbe (1995b) 14 species from Kanha Tiger Reserve, Madhya Pradesh. Gajbe (2003) prepared a checklist of 186 species of spiders in 69 genera under 24 families distributed in Madhya Pradesh and Chhattisgarh. Patel and Vyas (2001) conducted biodiversity studies in Hingolgarh Nature Education Sanctuary, Gujarat and described 56 species of spiders belonging to 34 genera distributed in 18 families. He also carried out spider diversity studies in Vansda National Park during 2001-2002. Patel (2003) described 91 species belonging to 53 genera from Parabikulam Wildlife Sanctuary, Kerala. Manju Silwal *et al.* (2003) recorded 116 species from 66 genera and 25 families of spiders from Purna wildlife Sanctuary, Dangs, Gujarat. Majumdar (2004a) studied about the wolf spider of Sundarbans and described a new species *Pardosa* Koch (Majumdar, 2004b). Sivaperuman *et al.*, (2004) studied the spiders in Desert National Park, Rajasthan. Bastawade (2004) described arachnid fauna of orders Araneae, Scorpionida and Solifugi from Melghat Tiger Reserve, Amravati, Maharashtra State.

So far nobody has worked out or studied the spider fauna of Radhanagari Wildlife Sanctuary, Chandoli National Park and Koyna Wildlife Sanctuary and hence we have decided to explore the spider diversity from above three localities.

The study area:

The Western Ghats constitute the range of hills running almost parallel to Arabian Sea through Kerala, Tamilnadu, Karnataka, Goa and Maharashtra. Western Ghats area of India is considered as an important biodiversity hot spot. Recently Western Ghats is declared as world heritage site.

The present study is restricted to Radhanagari Wildlife Sanctuary, Chandoli National Park and Koyna Wildlife Sanctuary . which forms the northern end of Western Ghats. The main geological formation of the area is the Deccan trap. The total area of the Radhanagari Wildlife Sanctuary is 351.16 sq. The most of the area of this Sanctuary is a undulating belt, which is characteristic feature of Western Ghats. The plateau region is mostly covered with the grasses. The climate is moderate. During summer the mean temperature ranges from 30°C to 35°C, Maximum being 41°C. The minimum temperature during winter is 9°C to 16°C. The mean annual rainfall is about 2500 mm and maximum being 5000 mm. Chandoli Wildlife Sanctuary is spread 308.97 sq. km. Koyna Wildlife Sanctuary covers an area of 423.55 Sq. Kms. and comprises geographical area of 50 villages. The Sanctuary area is in the catchment of the river Koyna. Most of the area is dense semi-evergreen forest with a wide range of flora. The area prevails humid and moderate climate, heavy rain.

METHODS

To document a comprehensive inventory of spiders from Radhanagari Wildlife Sanctuary, Chandoli National Park and Koyna Wildlife Sanctuary, well established sampling protocols for spider collection were adopted in different selected sampling plots. The collection techniques used were hand collection, vegetation beating, litter sampling and sweep netting. The collections were made during early morning hours (6 hours to 9 hours) and day time (16 hours to 18 hours), from different parts of the microhabitats, like, rolled or folded leaves, plant branches, leaf litter, tree trunks, rock surface, grass blades, etc. The Lycosids and Gnaphosids were collected from the soil surface and also from the river beds.

Each spider was identified mainly on the basis of morphological characteristics, epigyne and or palp structure after carrying out the necessary dissections and by using the literature (Kaston, 1978; Barrion and Litsinger, 1995; Tikader, 1987 and Mujumdar, 2007). The details of body parts of specimens were examined in 70% ethanol under a good quality stereo zoom microscope. The identification of species was carried out by the comparison of morphological features with the help of published literature, standard books and field guides.

OBSERVATIONS AND RESULTS

A total of 247 species (Table-1) belonging to 119 genera and 28 families were recorded from the study area during 2010-2012. Among all these 28 families, high diversity was observed in the families Araneidae (46 species) > Salticidae (38 species) > Lycosidae (30 species) > Thomisidae (24 species).

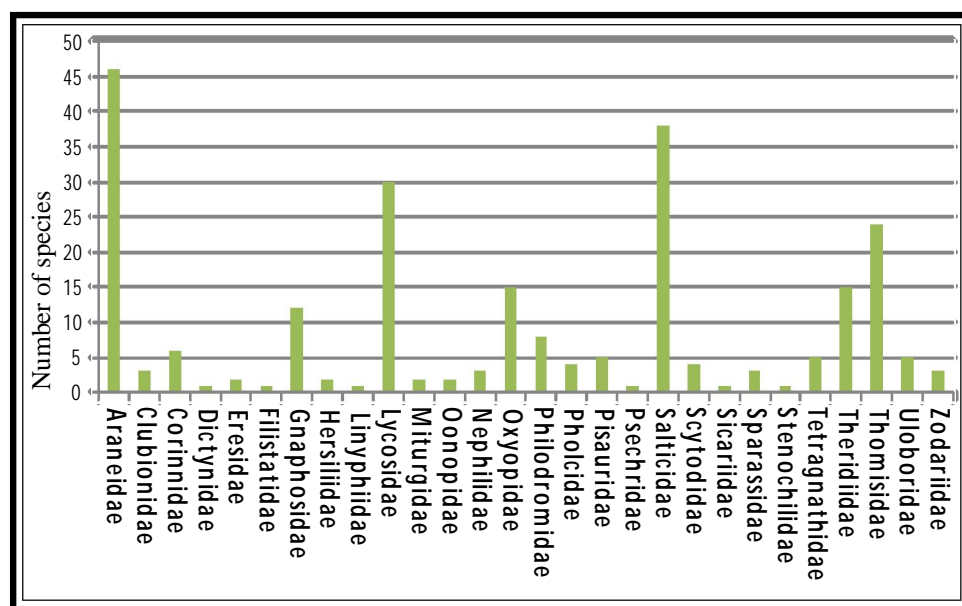


Figure:1, Family wise number of spider species from Radhanagari Wildlife Sanctuary, Chandoli National Park and Koyna Wildlife Sanctuary

Table:1, Diversity of spiders in Radhanagari Wildlife Sanctuary, Chandoli National Park and Koyna Wildlife Sanctuary:

D) Family : Araneidae: 19 genera with 46 species

1. *Arachnura angura* Tikader, 1970
2. *Araneus mitificus* (Simon, 1886)
3. *Araneus ellipticus* (Tikader & Bal, 1981)
4. *Araneus himalayaensis* Tikader, 1975
5. *Argiope aemula* (Walckenaer) Female and male
6. *Argiope anasuja* (Thorell) Female
7. *Argiope lobata* (Pallas, 1772)
8. *Argiope trifasciata* (Forsskal, 1775)
9. *Chorizopes anjanus* Tikader, 1965
10. *Chorizopes bengalensis* Tikader, 1975
11. *Chorizopes kastoni* Gajbe & Gajbe, 2004
12. *Chorizopes khanjanus* Tikader, 1965
13. *Cyrtarachne raniceps* Pocock, 1900
14. *Cyclosa bifida* (Doleschall, 1859)
15. *Cyclosa hexatuberculata* Tikader, 1982
16. *Cyclosa confraga* (Thorell, 1892)
17. *Cyclosa spirifera* (Simon, 1889)
18. *Cyclosa moondensis* (Tikader, 1963)
19. *Cyclosa insulana* (Costa, 1934)
20. *Cyrtophora cicatrosa* (Stoliczka, 1869)
21. *Cyrtophora citricola* (Forsskal, 1775)
22. *Cyrtophora moluccensis* (Doleschall, 1857)
23. *Eriovixia laglaisei* (Simon, 1877)
24. *Gasteracantha geminata* (Fabricius, 1798)
25. *Gasteracantha dalyi* Pocock, 1900
26. *Gasteracantha kuhli* (CL. Koch) Female
27. *Gasteracantha remifera* Butler, 1873
28. *Telecantha brevispina* (Doleschall)
29. *Gea spinipes* C.L. Koch, 1843
30. *Larinia chloris* (Audouin, 1826)
31. *Larinia emertoni* Gajbe & Gajbe, 2004
32. *Lipocrea fusiformis* (Thorell, 1877)
33. *Neoscona bengalensis* Tikader & Bal, 1981
34. *Neoscona molemensis* Tikader & Bal, 1981
35. *Neoscona mukerjei* (Tikader) Female
36. *Neoscona nautica* (L. Koch, 1875)
37. *Neoscona parambikulamensis* Patel, 2003
38. *Neoscona rumpfi* (Thorell, 1878)
39. *Neoscona theisi* (Walckenaer, 1842)
40. *Neoscona vigilans* (Blackwall, 1865)

41. *Ordgarius hobsoni* (O. P.-Cambridge, 1877)
42. *Parawixia dehaani* (Doleschall, 1859)
43. *Poltys illepidus* C. L. Koch, 1843
44. *Poltys nagpurensis* Tikader, 1982
45. *Zilla globosa* Saha & Raychaudhuri, 2004
46. *Zygiella indica* Tikader & Bal, 1980

II) Family: Clubionidae: 1genus with 3 species

1. *Clubiona drassodes* O. P.-Cambridge, 1874
2. *Clubiona bengalensis* Biswas, 1984
3. *Clubiona tikaderi* Majumder & Tikader, 1991

III) Family : Corinnidae: 2 genera with 6 species

1. *Castianeira zetes* Simon, 1897
2. *Castianeira bengalensis* Biswas, 1984
3. *Castianeira flavipes* Gravely, 1931
4. *Castianeira himalayensis* Gravely, 1931
5. *Castianeira indica* Tikader, 1981
6. *Trachelas oreophilus* Simon, 1906

IV) Family Dictynidae: 1 genus with 1 species

1. *Dictyna turbida* Simon, 1905

V) Family : Eresidae: 1 genus with 2 species

1. *Stegodyphus sarasinorum* Karsch, 1891
2. *Stegodyphus tibialis* (O.P.-Cambridge, 1869)

VI) Family : Filistatidae: 1 genus with 1 species

1. *Pritha insularis* (Thorell, 1881)

VII) Family : Gnaphosidae: 5 genera with 12 species

1. *Drassodes sitae* Tikader & Gajbe, 1975
2. *Drassodes deoprayagensis* Tikader & Gajbe, 1975
3. *Drassodes tikaderi* (Gajbe, 1987)
4. *Drassodes villosus* (Thorell, 1856)
5. *Drassodes viveki* (Gajbe, 1992)
6. *Gnaphosa poonaensis* Tikader, 1973
7. *Poecilochroa barmani* Tikader, 1982
8. *Scotophaeus bharatae* Gajbe, 1989
9. *Scotophaeus poonaensis* Tikader, 1982
10. *Zelotes naliniae* Tikader & Gajbe, 1979
11. *Zelotes nasikensis* Tikader & Gajbe, 1976
12. *Zelotes poonaensis* Tikader & Gajbe, 1976

VIII) Family : Hersiliidae: 1 genus with 2 species

1. *Hersilia savignyi* Lucas, 1836
2. *Hersilia tibialis* Baehr & Baehr, 1993

IX) Family Linyphiidae: 1 genus with 1 species

1. *Linyphia urbasae* Tikader, 1970

X) Family : Lycosidae:10 genera with 29 species

1. *Arctosa indica* Tikader & Malhotra, 1980
2. *Arctosa mulani* (Dyal, 1935)
3. *Evippa banarensis* Tikader & Malhotra, 1980
4. *Evippa mandlaensis* Gajbe, 2004
5. *Evippa shivajii* Tikader & Malhotra, 1980
6. *Geolycosa carli* (Reimoser, 1934)
7. *Hippasa agelenoides*
8. *Hippasa greenalliae* (Blackwall, 1867)
9. *Hippasa hansae* Gajbe & Gajbe, 1999
10. *Hippasa holmerae* Thorell, 1895
11. *Hippasa loundesi* Gravely, 1924
12. *Hippasa madhuae* Tikader & Malhotra, 1980
13. *Hogna stictopyga* (Thorell, 1895)
14. *Lycosa balaramai* Patel & Reddy, 1993
15. *Lycosa bhatnagari* Sadana, 1969
16. *Lycosa fuscana* Pocock, 1901
17. *Lycosa geotubalis* Tikader & Malhotra, 1980
18. *Lycosa indagatrix* Walckenaer, 1837
19. *Lycosa poonaensis* Tikader & Malhotra, 1980
20. *Lycosa thoracica* Patel & Reddy, 1993
21. *Pardosa birmanica* Simon, 1884
22. *Pardosa leucopalpis* Gravely, 1924
23. *Pardosa mukundi* Tikader & Malhotra, 1980
24. *Pardosa partita* Simon, 1885
25. *Pardosa ranjani* Gajbe, 2004
26. *Pardosa subhadrae* Patel & Reddy, 1993
27. *Trochosa gunturensis* Patel & Reddy, 1993
28. *Wadicosa quadrifera* (Gravely, 1924)
29. *Zoica puellula* (Simon, 1898)

XI) Family : Miturgidae: 1 genus with 2species

1. *Cheiracanthium danieli* Tikader, 1975 Comments: Endemic to India
2. *Cheiracanthium indicum* O.P.-Cambridge, 1874

XII) Family Oonopidae: 1 genus with 2species

1. *Gamasomorpha nigripalpis* Simon, 1893
2. *Gamasomorpha taprobanica* Simon, 1893

XIII) Family : Nephilidae: 2 genera with 3 species

1. *Herennia ornatissima* (Doleschall, 1859)
2. *Nephila kuhlii* Doleschall, 1859
3. *Nephila maculata* (Fabricius) 1793

XIV) Family : Oxyopidae; 2 genera with 15 species

1. *Oxyopes bharatae* Gajbe, 1999
2. *Oxyopes birmanicus* Thorell, 1887
3. *Oxyopes boriensis* Bodkhe & Vankhede, 2012
4. *Oxyopes chittrae* Tikader, 1965
5. *Oxyopes indicus* (Walckenaer, 1805)
6. *Oxyopes javanus* Thorell, 1887
7. *Oxyopes kamalae* Gajbe, 1999
8. *Oxyopes ketani* Gajbe & Gajbe, 1999
9. *Oxyopes pankaji* Gajbe & Gajbe, 2001
10. *Oxyopes pawani* Gajbe, 1992
11. *Oxyopes shweta* Tikader, 1970
12. *Oxyopes sitae* Tikader, 1970
13. *Oxyopes tikaderi* Biswas & Majumder, 1995
14. *Peucetia elegans* (Blackwall, 1864)
15. *Peucetia viridana* Stoliczka, 1869

XV) Family : Philodromidae: 3 genera with 8 species

1. *Philodromus barmani* Tikader, 1980
2. *Philodromus pali* Gajbe, 2000
3. *Thanatus ketani* Bhandari and Gajbe, 2001
4. *Thanatus dhakuricus* Tikader, 1960
5. *Thanatus indicus* Simon, 1885
6. *Tibellus elongatus* Tikader, 1960
7. *Tibellus poonaensis* Tikader, 1962
8. *Tibellus vitilis* Simon, 1906

XVI) Family : Pholcidae: 4 genera with 4 species

1. *Artema atlanta* Walckenaer, 1837
2. *Crossopriza lyoni* Blackwall, 1867
3. *Pholcus phalangioides* (Fuesslin, 1775)
4. *Smeringopus pallidus* Blackwall, 1858

XVII) Family: Pisauridae: 4 genera with 5 species

1. *Pisaura gitae* Tikader, 1970
2. *Pisaura putiana* Barrion & Litsinger, 1995
3. *Dendrolycosa gracilis* Thorell, 1891
4. *Nilus marginatus* (Simon, 1888)
5. *Thalassius albocinctus* Doleschall, 1859

XVIII) Family : Psechridae: 1 genus with 1 species

1. *Psechrus alticeps* Pocock, 1899

XIX) Family : Salticidae: 22 genera with 38 species

2. *Aelurillus quadrimaculatus* Simon, 1889
3. *Asemonea tenuipes* (O.P.-Cambridge, 1869)
4. *Bianor angulosus* (Karsch, 1879)
5. *Brettus albolimbatus* Simon, 1900
6. *Cosmophasis miniaceomicans* (Simon, 1888)
7. *Epeus albus* Prószyński, 1992
8. *Epeus chilapataensis* (Biswas & Biswas, 1992)
9. *Euophrys chiriatapuensis* Tikader, 1977
10. *Menemerus bivittatus* (Dufour, 1831)
11. *Hasarius adansoni* (Audouin, 1826)
12. *Hyllus semicupreus* (Simon, 1885)
13. *Marpissa singhi* Monga, Singh & Sadana, 1989
14. *Marpissa tigrina* Tikader, 1965
15. *Menemerus bivittatus* (Dufour, 1831)
16. *Myrmarachne incerta* Narayan, 1915
17. *Myrmarachne jajpurensis* Prószyński, 1992
18. *Myrmarachne maratha* Tikader, 1973
19. *Myrmarachne orientales* Tikader, 1973
20. *Myrmarachne plataleoides* (O.P.-Cambridge, 1869)
21. *Myrmarachne poonaensis* Tikader, 1973
22. *Myrmarachne providens* (Peckham & Peckham, 1892)
23. *Myrmarachne satarensis* Narayan, 1915
24. *Myrmarachne uniseriata* Narayan, 1915
25. *Phintella vittata* (C. L. Koch, 1846)
26. *Plexippus paykulli* (Savigny & Audouin, 1825)
27. *Plexippus petersi* (Karsch, 1878)
28. *Portia fimbriata* (Dolleschall, 1859)
29. *Rhene danieli* Tikader, 1973
30. *Rhene decorata* Tikader, 1977
31. *Rhene flavicomans* Simon, 1902
32. *Rhene haldanei* Gajbe, 2004
33. *Rhene indica* Tikader, 1973
34. *Telamonia dimidiata* (Simon, 1899)
35. *Telamonia peckhami* Thorell, 1891
36. *Thiania bhamoensis* Thorell, 1887
37. *Thyene imperialis* (Rossi, 1846)
38. *Zygoballus pashanensis* Tikader, 1975

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XX) Family : Scytodidae: 1 genus and 4 species

1. *Scytodes alfredi* Gajbe, 2004
2. *Scytodes fusca* Walckenaer, 1837
3. *Scytodes pallida* Doleschall, 1859
4. *Scytodes thoracica* (Latreille, 1802)

XXI) Family : Sicariidae: 1 genus and 1 species

1. *Loxosceles rufescens* (Dufour, 1820)

XXII) Family : Sparassidae: 2 genera and 3 species

1. *Heteropoda kandiana* Pocock, 1899
2. *Heteropoda venatoria* Linnaeus, 1767
3. *Olios milleti* Pocock, 1901

XXIII) Family Stenochilidae: 1 genus and 1 species

1. *Stenochilus hobsoni* O. P.-Cambridge, 1870

XXIV) Family : Tetragnathidae: 4 genera and 5 species

1. *Leucauge decorata* (Blackwall) 1864
2. *Opadometa fastigata* (Simon, 1877)
3. *Tetragnatha javana* (Thorell, 1890)
4. *Tetragnatha viridorufa* Gravely, 1921
5. *Poecilotheria regalis* Pocock, 1899

XXV) Family: Theridiidae: 11 genera and 15 species

1. *Achaearanea mundulum* (L. Koch) 1872
2. ***Achaearanea triangularis* Patel nom. nov. 2003**
3. *Argyroides flagellum* (Doleschall, 1857)
4. *Argyroides jamkhedes* Tikader, 1963
5. *Ariamnes pavesii* Leardi, 1902
6. *Chrysso picturata* (Simon, 1895)
7. *Latrodectus hasselti* Thorell, 1870
8. *Phoroncidia testudo* (O.P.-Cambridge, 1873)
9. *Propostira quadrangulata* Simon, 1894
10. *Rhomphaea projiciens* (O.P.-Cambridge, 1896)
11. *Steatoda rufoannulata* (Simon, 1899)
12. *Theridion incertum* O.P.-Cambridge, 1885
13. *Theridion spinosissimum* Caporiacco, 1934
14. *Theridion tikaderi* Patel, 1973
15. *Theridula angula* Tikader, 1970

XXVI) Family: Thomisidae: 12 genera and 24 species

1. *Amyciaea forticeps* (O.P.-Cambridge, 1873)
2. *Camaricus bipunctatus* Bastawade, 2002

3. *Camaricus formosus* Thorell, 1887
4. *Diaea bengalensis* Biswas & Majumder, 1981
5. *Misumena greenae* Tikader, 1965
6. *Misumena indra* Tikader, 1963
7. *Misumenops khandalaensis* Tikader, 1965
8. *Oxytate elongata* (Tikader, 1980)
9. *Ozyptila chandosiensis* Tikader, 1980
10. *Ozyptila maratha* Tikader, 1971
11. *Runcinia ghorpadei* Tikader, 1980
12. *Runcinia khandari* Gajbe, 2004
13. *Runcinia yogeshi* Gajbe & Gajbe, 2001
14. *Strigoplus moluri* Patel, 2003
15. *Thomisus granulifrons* Simon, 1906
16. *Thomisus pathaki* Gajbe, 2004
17. *Thomisus pooneus* Tikader, 1965
18. *Thomisus viveki* Gajbe,
19. *Tmarus jabalpurensis* Gajbe & Gajbe, 1999
20. *Tmarus kotigeharus* Tikader, 1963
21. *Xysticus bharatae* Gajbe & Gajbe, 1999
22. *Xysticus breviceps* O.P.-Cambridge, 1885
23. *Xysticus khasiensis* Tikader, 1980
24. *Xysticus tikaderi* Bhandari & Gajbe, 2001

XXVII) Family Uloboridae: 3 genera and 5 species

1. *Miagrammopes indicus* Tikader, 1971
2. *Miagrammopes poonaensis* Tikader, 1971
3. *Uloborus khasiensis* Tikader, 1969
4. *Uloborus krishnae* Tikader, 1970
5. *Zosis geniculata* (Olivier, 1789)

XXVIII) Family : Zodariidae: 2 genera and 3 species

1. *Asceua cingulata* (Simon, 1905)
2. *Lutica bengalensis* Tikader & Patel, 1975
3. *Lutica deccanensis* Tikader & Malhotra, 1976

Thus the results indicate the dominance of ground dwelling spiders like Salticids, Gnaphosids and Salticids in these three adjacent Sanctuaries. The forest is semievergreen and rich in shrubs as understory habitats resulting into ground dwelling spiders.

REFERENCES

- Barrion, A.T and Litsinger, J. A. (1995):** Riceland spiders of south and Southeast Asia, CAB International, Cambridge, UK: 1-700.
- Bastawade, D. B. (2004):** Arachnid fauna of orders araneae, Scorpionida and Solifugi from melghat Tiger Reserve, Distt. Amravati, Maharashtra.

Proceeding of Symposium on Three Decades of Project Tiger in Melghats. 8-9 Octo. 2004, 70-71.

- Biswas, B. and Biswas, K. (2004):** Araneae: Spiders. In: Fauna of Manipur, State Fauna Series 10, Zoological Survey of India: 25-46.
- Blackwell, J. (1867):** Description of seven new species of East Indian spiders recieved from the Rev. O. P. Cambridge. *Annals and Magazine of Natural History.* (3)14: 36-45.
- Gajbe, P. (2003):** Checklists of Spiders (Arachnid; Araneae) of Madhya Pradesh and Chattisgarh. *Zoos. Print Journal* 18 (10): 1223-1226.
- Gajbe, U. A. (1995a):** Spiders Fauna of Conservation Areas: Fauna of Kanha Tiger Reserve, Madhya Pradesh. Zoological Survey of India, Publication: 27-30.
- Gajbe, U. A. (1995b):** Spiders, Fauna of Conservation Areas: Fauna of Indravati Tiger Reserve, Madhya Pradesh. Zoological Survey of India, Publication: 53-56.
- Gajbe, U. A. (1999):** Studies on some spiders of the family Oxyopidae (Araneae: Arachnida) from India: Records of Zoological Survey of India 97(3): 31-79.
- Gajbe, U. A.(1987):** A new scopodes spiders from India Araneae: Gnaphosidae). *Bulletin of Zoological Survey of India.* 8: 285-287.
- Karsch, E. (1873):** Verzeichniss Westfalischer Spinnen (Araneiden) *Verh.naturh. Ver. Preuss.Rhein.Westfal.*10: 113-160.
- Kaston, B. J. (1978):** How to know spiders? The pictured key Nature series. Wm. C. Brown. Co. Publishers. Dubuque, Iowa, USA: 1-272.
- Keswani, S.; Hadole, P.and Rajoria, A.(2012):** Checklist of spiders (Arachnida: Araneae) From India 2012. *Ind. j. Arachnol. Vol1(1);* 1-129.
- Majumder ,S.C. (2007):** Pictorial handbook on spiders of of Sunderbans :West Bengal.Zoological Survey of India :138pp.
- Majumder, S. C. (2004a):** A new species of wolf spider (Araneae:Lycosidae) from crop fields of the Sunderban Estuary, West Bengal, India. *J. Bombay. Nat. Hist. Soc.*(101), 121-123.
- Majumder, S. C. (2004b):** Studies on spider fauna of coastal region of India: description of two new species of *Pardosa* Koch (Araneae:Lycosidae) from the coastal region of Sunderbans, West Bengal (Part-1). *Rec. Zool. Surv. India.* (102), 97-103.
- Manju Silwal; B.Suresh and Bonny Pilo. (2003):** Spiders of Purna wildlife Sanctuary, Dangs, Gujarat. *Zoos. Print Journal* 18 (11): 1259 -1263.
- Patel, B. H. (2002):** Fauna of Protected Areas –I, Spiders of Vansda National Park, Gujarat. *Zoos. Print Journal* 18 (4): 1079 -1083.
- Patel, B. H. (2003):** Fauna of Protected Areas - A Preliminary list of Spiders with the descriptions of three new species from Parambikulam Wildlife sanctuary, Kerala. *Zoos. Print Journal* 18 (10): 1207 -1212.

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- Patel, B. H. and Vyas, R. V. (2001):** Spiders of Hingolghadh Nature Sanctuary, Gujarat, India. *Zoos Print Journal*. 16(9): 589-590.
- Platnick, N. I. (2013):** The world spider catalog, version 13.5. American Museum of Natural History, online at <http://research.amnh.org/iz/spiders/catalog>.
- Pocock, R. I. (1900):** The Fauna of British India, Arachnida. Taylor and Francis, London: 279pp.
- Rane, P. D and Singh, R. K. (1977):** Spiders (Arachnida: Araneae) from Kanha National Park, Madhya Pradesh, India. Newsletter Zoological Survey of India., 3(2): 84.
- Stoliczka, F. (1869):** Contribution towards the Knowledge of Indian Arachnoidae. Journal of Asiatic Society of Bengal. 38: 201-251.
- Thorell, T. (1895):** Descriptive Catalogue of the spiders of Burma. Brit. Mus. Lond. UK: 1-406
- Tikader, B. K and Biswas, B. (1981):** Spider fauna of Calcutta and vicinity: Part 1. Records of Zoological survey of India, Occasional Paper 30: 1-49.
- Tikader, B. K and Malhotra, M.S. (1980):** The fauna of India. Spiders (Thomisidae and Lycosidae). Zoological Survey of India, Calcutta: 44pp.
- Tikader, B. K. (1980):** Fauna of India - Araneae: Spiders, Vol. I (Araneidae & Gnaphosidae). Zoological Survey of India. 448 pp.
- Tikader, B. K. (1982):** Fauna of India - Araneae: Spiders, Vol. II (Thomisidae and Lycosidae). Zoological Survey of India. 533 pp.
- Tikader, B. K. (1987):** Hand book of Indian Spiders. Zoological Survey of India: 251 pp.